AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

1. - 25. (Canceled)

26. (Currently Amended) A method for automatically registering a sensed image with a reference image, comprising:

using a sensor mounted on a platform, acquiring an image of a scene ~~with a sensor mounted on a platform~~ and at least one sensor parameter that indicates a perspective of the sensor relative to the scene;

~~determining a center of the scene in the sensor image based on~~ determining a footprint of the sensor relative to a coordinate system associated with a reference image database and a digital elevation database, the footprint including at least a portion of the scene in the sensor image;

accessing the digital elevation database to obtain a ~~geocoded~~ reference digital elevation model geocoded in the coordinate system and whose geographic extent encompasses an area ~~around the center of the scene in the sensor image~~ that includes the sensor footprint;

accessing the reference image database to obtain a ~~geocoded~~ reference image geocoded in the coordinate system and that encompasses an area ~~around the center of the scene in the sensor image~~ that includes the sensor footprint;

generating a synthetic 3-D model of [[the]] an area around [[the]] a center of the scene by combining the geocoded reference digital elevation model and the geocoded reference image such that each pixel of the geocoded reference image is associated with an elevation from the geocoded reference digital elevation model;

transforming the synthetic 3-D model into a synthetic perspective image of the scene, the transforming based on a type of the sensor and the at least one sensor parameter; and

registering the sensor image of the scene with the synthetic perspective image to geocode the sensor image using a mutual information model ;

said method performed by one or more processors.

27. (Previously Presented) The method of Claim 26, wherein a type of the sensor further comprises at least one of the following: a pinhole camera, a lens camera, and a synthetic aperture radar sensor.

28. (Previously Presented) The method of Claim 26, wherein the at least one sensor parameter further comprises a plurality of sensor parameters that include at least a field of view of the sensor, size of the image in pixel units, a resolution of the image, a focal length, an elevation angle and an azimuth angle.

29. (Previously Presented) The method of Claim 28, wherein registering the sensor image of the scene with the synthetic perspective image further comprises:

determining a projection for the sensor image based on the type of the sensor and the plurality of sensor parameters; and

determining an inverse projection for the sensor image based on the type of the sensor and the plurality of sensor parameters.

30. (Previously Presented) The method of Claim 26, further comprising:

determining a location of the sensor relative to the scene;

determining projection parameters for the perspective of the sensor relative to the scene based on the location of the sensor relative to the scene and the center of the scene; and

determining an inverse projection for the perspective of the sensor relative to the scene based on the location of the sensor relative to the scene and the center of the scene.

31. (Previously Presented) The method of Claim 29, wherein accessing the reference image database further comprises:

retrieving reference data that includes a perspective of the reference image relative to the scene; and

retrieving a reference projection model for the reference image.

32. (Previously Presented) The method of Claim 31, wherein transforming the synthetic 3-D model into the synthetic perspective image further comprises:

determining a projection of the reference image based on the reference data and the reference projection model; and

determining an inverse projection of the reference image based on the reference data and the reference projection model.

33. (Previously Presented) The method of Claim 32, further comprising:

using the inverse projection of the reference image to remove projective distortion from the reference image.

34. (Previously Presented) The method of Claim 32, further comprising:

transforming the synthetic 3-D model into an orthographic projection using the inverse projection of the reference image.

35. (Previously Presented) The method of Claim 32, wherein the projection parameters for the perspective of the sensor define a sensor projection model, and the sensor projection model and the reference projection model are the same projection model.

36. (Previously Presented) The method of Claim 32, wherein the projection parameters for the perspective of the sensor define a sensor projection model, and the sensor projection model and the reference projection model are different projection models.

37. (Previously Presented) The method of Claim 32, wherein registering the sensor image of the scene with the synthetic perspective image further comprises:

determining a translation offset between the sensor image and the synthetic perspective image; and

matching pixels in the sensor image to pixels in the synthetic perspective image using the translation offset.

38. (Previously Presented) The method of Claim 37, wherein matching pixels in the sensor image to pixels in the synthetic perspective image further comprises:

matching pixels in the sensor image to pixels in the synthetic perspective image using the inverse projection of the perspective of the sensor.

39. (Previously Presented) The method of Claim 26, wherein registering the sensor image further comprises:

associating the geocode of a pixel in the reference image with the geocode of a pixel in the sensor image to geocode the sensor image.

40. (Currently Amended) A method for automatically registering a sensed image with a reference image, comprising:

using a sensor mounted on a platform, acquiring an image of a scene ~~with a sensor mounted on a platform, the image including~~ and at least one sensor parameter that indicates a perspective of the sensor relative to the scene;

~~determining a center of the scene in the sensor image based on~~ determining a footprint of the sensor relative to a coordinate system associated with a reference image database, the footprint including at least a portion of the scene in the sensor image;

accessing the reference image database to obtain a ~~geocoded~~ reference image geocoded in the coordinate system and that includes a portion of a right stereo image and a portion of a left stereo image, which encompasses an area ~~around the center of the scene in the sensor image~~ that includes the sensor footprint;

processing the left and right stereo images to derive a ~~geocoded~~ reference digital elevation model geocoded in the coordinate system and whose geographic extent encompasses an area ~~around the center of the scene in the sensor image~~ that includes the sensor footprint;

generating a synthetic 3-D model of [[the]] an area around [[the]] a center of the scene by combining the geocoded reference digital elevation model and the geocoded reference image such that each pixel of the geocoded reference image is associated with an elevation from the geocoded reference digital elevation model;

transforming the synthetic 3-D model into a synthetic perspective image of the scene, the transforming based on a type of the sensor and the at least one sensor parameter; and

registering the sensor image of the scene with the synthetic perspective image to geocode the sensor image using a mutual information model;

said method performed by one or more processors.

41. (Previously Presented) The method of Claim 40, wherein a type of the sensor further comprises one or more of the following: a pinhole camera, a lens camera, and a synthetic aperture radar sensor.

42. (Previously Presented) The method of Claim 40, wherein the at least one sensor parameter further comprises a plurality of sensor parameters that include at least a field of view of the sensor, size of the image in pixel units, a resolution of the image, a focal length, an elevation angle and an azimuth angle.

43. (Previously Presented) The method of Claim 42, wherein registering the sensor image of the scene with the synthetic perspective image further comprises:

determining a projection for the sensor image based on the type of sensor and the plurality of sensor parameters; and

determining an inverse projection for the sensor image based on the type of the sensor and the plurality of sensor parameters.

44. (Previously Presented) The method of Claim 40, further comprising:

determining a location of the sensor relative to the scene;

determining projection parameters for the perspective of the sensor relative to the scene based on the location of the sensor relative to the scene and the center of the scene; and

determining an inverse projection for the perspective of the sensor relative to the scene based on the location of the sensor relative to the scene and the center of the scene.

45. (Previously Presented) The method of Claim 44, wherein accessing the reference image database further comprises:

retrieving reference data that includes a perspective of the reference image relative to the scene; and

retrieving a reference projection model for the reference image.

46. (Previously Presented) The method of Claim 45, wherein transforming the synthetic 3-D model into the synthetic perspective image further comprises:

determining a projection of the reference image based on the reference data and the reference projection model; and

determining an inverse projection of the reference image based on the reference data and the reference projection model.

47. (Previously Presented) The method of Claim 46, further comprising:

using the inverse projection of the reference image to remove projective distortion from the reference image; and

transforming the synthetic 3-D model into an orthographic projection using the inverse projection of the reference image.

48. (Previously Presented) The method of Claim 46, wherein registering the sensor image of the scene with the synthetic perspective image further comprises:

determining a translation offset between the sensor image and the synthetic perspective image; and

matching pixels in the sensor image to pixels in the synthetic perspective image using the translation offset.

49. (Previously Presented) The method of Claim 48, wherein matching pixels in the sensor image to pixels in the synthetic perspective image further comprises:

matching pixels in the sensor image to pixels in the synthetic perspective image using the inverse projection of the perspective of the sensor.

50. (Previously Presented) The method of Claim 40, wherein registering the sensor image further comprises:

associating the geocode of a pixel in the reference image with the geocode of a pixel in the sensor image to geocode the sensor image.